As of December 2000 Banco de Portugal has released projections for the Portuguese economy. This falls within the central bank’s mandate, given that the development of prospective and credible macroeconomic scenarios helps to reduce uncertainty, anchor agents’ expectations and, ultimately, improve the quality of their decisions.

The projections are conditional on a set of assumptions that help characterise the performance of the Portuguese economy on the basis of a macroeconometric model, around which information on past and more recent developments is organised. The importance of these assumptions is discussed in the section below. Section 2 assesses Banco de Portugal’s performance when projecting GDP growth in the period 2009-12, to the extent that this variable plays a crucial role in the agents’ decisions. Subsection 2.1 compares this performance to that of a number of international institutions; Subsection 2.2 breaks down Banco de Portugal’s projection errors, on the basis of the model used to produce the projections.

Notwithstanding the continuous improvement of projection instruments used, results suggest that the uncertainty surrounding fiscal and external environment assumptions is particularly important to explain the projection errors from the recent past. As such, both the risk and uncertainty analysis included in articles on projections and the identification of associated risk factors are of the utmost importance.

1. The Importance of Defining Assumptions

As regards the international environment, projections for the Portuguese economy are based on a set of assumptions on (i) world economic growth, particularly in the main trading partners; (ii) commodity prices and other imported goods prices; (iii) developments in the nominal effective exchange rate; (iv) the monetary policy implemented by the European Central Bank and its impact on money market rates; and (v) government debt interest rates. This approach ensures consistency, given that Portugal is a small open economy integrated in the euro area, which means that international developments are not likely to be affected by domestic economic developments.

Due to its participation in the Eurosystem’s multilateral projection exercises, Banco de Portugal has been granted access to a common set of assumptions on the international environment. As such, prospective scenarios published are based on a given international environment drawn upon by national central banks, which is produced by a large group of experts and previously scrutinised at Eurosystem level.

Turning to prospective fiscal policy developments, projections published by Banco de Portugal only include fiscal policy measures that have already been approved and those that, albeit still not approved, have been specified in sufficient detail and are likely to pass the legislative process. This option aims, on the one hand, to ensure maximum transparency and intertemporal consistency of projections and, on the other hand, make it immune to the debate on measures that would probably be incorrectly assessed due to their insufficient specification detail. The inclusion of measures that do not comply with these criteria could be interpreted as the central bank assessing the policy measures under discussion, something that does not fall within its tasks. The same assumption applies when national central banks produce projections within the scope of the Eurosystem’s multilateral projection exercises, which is crucial for ensuring the credibility and independence of projections.

When analysing the Portuguese economy framed by the Economic and Financial Assistance Programme (EFAP), the consolidation process unfolds on a multi-annual basis. However the available information is limited regarding the time profile as well as the detailed composition of the consolidation measures.
Against a background where policy measures needed to ensure compliance with the fiscal targets are frequently discussed and their definition is a continuous process, the methodology described in the above paragraph is crucial for ensuring the credibility and independence of projections. However, this assumption has led to an overvaluation of GDP growth since the beginning of the EFAP, namely when taking into account projection horizons exceeding that of the approved State Budget. In this context, the assessment of risks associated with the specification of additional fiscal measures is key when interpreting projections and cannot be separated from the projection itself.

Therefore, given the assumptions made, the prospective scenarios published by Banco de Portugal should be interpreted as conditional projections, i.e., representing the most likely developments in the economy, conditional on the materialization of these assumptions. In the current juncture of high uncertainty surrounding the international environment, persistent international financial market tensions and the need to adopt significant policy measures that ensure compliance with the fiscal targets, the non-materialisation of these assumptions has resulted in a sizeable increase in projection errors on the part of institutions publishing projections for the Portuguese economy.

2. An Assessment of the Recent Performance of Banco de Portugal Projections

As part of its mission, Banco de Portugal regularly publishes macroeconomic projections for the Portuguese economy in this Economic Bulletin. Developments in the Portuguese economy are also monitored by a number of international institutions that also produce macroeconomic projections on a regular basis. The quality of published projections is regularly monitored, given that information incorporated in projection errors is key for analysing and improving projection exercises.

This section begins by presenting a comparison between the performance of Banco de Portugal projections for economic activity growth and those produced by a number of international institutions that regularly produce projections for the Portuguese economy (more specifically, the European Commission, the IMF and the OECD). Subsequently, the projection model is used to breakdown Banco de Portugal’s projection errors, particularly as regards deviations from the assumptions for the international environment and developments in fiscal policy variables.

2.1. A comparison of the performance of projections published by Banco de Portugal, the European Commission, the IMF and the OECD

The assessment of the relative performance of projections published by Banco de Portugal and a number of international organisations falls within the performance monitoring process, making it possible to assess ex post the reliability of these projections. In this context, the relative performance of projections developed by Banco de Portugal should be compared with those produced by the European Commission, the IMF and the OECD. Similarly to Banco de Portugal, these institutions publish projections at least twice a year and cover a time horizon exceeding one year.

This comparison regards projections for GDP growth in the period 2009-12, which was marked at an early stage by the onset of a global financial crisis and, subsequently, its transmission to the sovereign debt markets of a number of euro area countries, including Portugal. This analysis includes projections published in the first and second halves of the year in the period 2008-12. To calculate the projection error, the actual value for the GDP growth rate was considered to be the value published by Statistics Portugal (INE) in the second half of the year following that covered by projections, so as to take into account retrospective revisions that are likely to occur in the course of the following year. The exception to this rule regards the calculation of errors for 2012, where the value released in the beginning of March 2013 by Statistics Portugal within the scope of the Quarterly National Accounts was taken as the actual value.

It should be noted that this comparison with the performance of other institutions is not without limi-
tations, owing to the nature of the exercise itself. The main shortfall is the inability to ensure that the projections produced by the different institutions are based on the same set of information. Indeed, institutions release their projections on different dates and have different cut-off dates for information and, at times, release dates vary within a sole institution. However, the strong correlation of projection errors seems to indicate that these information lags are not substantially relevant.

Developments illustrated in Chart 1 suggest that projections produced by Banco de Portugal tend to converge more rapidly to the actual value than those produced by the remaining institutions, although differences are relatively limited. Moreover, the sign of the projection errors tends to be common to all institutions.

A quantified analysis of the relative performance of institutions is possible with recourse to two indicators that are traditionally used in literature: the root mean square error of projection and the mean absolute deviation. These indicators measure the mean error with recourse to two metrics that diverge given that the first penalises large projection errors more severely, while the second penalises projection errors on a proportional basis.

The figures shown in Table 1 illustrate (in a summarised, quantified manner and based on synthetic indicators) the performance of the various institutions as regards projections for GDP growth. In absolute terms, projection errors increase for longer projection horizons, with a very sizeable increase for horizons

**Chart 1**


Sources: European Commission, IMF, OECD and Banco de Portugal.

Notes: The horizontal axis indicates the date on which the projection was produced (year and semester). The horizontal axis crosses the vertical axis at the actual value for GDP growth rate in the corresponding year.
Table 1

<table>
<thead>
<tr>
<th></th>
<th>Root mean square error</th>
<th>Mean absolute deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BdP</td>
<td>EC</td>
</tr>
<tr>
<td>6-month ahead</td>
<td>0.73</td>
<td>1.02</td>
</tr>
<tr>
<td>1-year ahead</td>
<td>1.26</td>
<td>1.61</td>
</tr>
<tr>
<td>1 1/2-years ahead</td>
<td>2.45</td>
<td>2.75</td>
</tr>
<tr>
<td>2-years ahead</td>
<td>2.88</td>
<td>2.82</td>
</tr>
</tbody>
</table>

Relative performance of Banco de Portugal (%)

<table>
<thead>
<tr>
<th></th>
<th>6-month ahead</th>
<th>1-year ahead</th>
<th>1 1/2-years ahead</th>
<th>2-years ahead</th>
</tr>
</thead>
<tbody>
<tr>
<td>BdP</td>
<td>-28</td>
<td>-22</td>
<td>-11</td>
<td>2</td>
</tr>
<tr>
<td>EC</td>
<td>-38</td>
<td>-18</td>
<td>-12</td>
<td>-17</td>
</tr>
<tr>
<td>OECD</td>
<td>-27</td>
<td>-30</td>
<td>-14</td>
<td>-17</td>
</tr>
<tr>
<td>IMF</td>
<td>-15</td>
<td>-6</td>
<td>-4</td>
<td>-10</td>
</tr>
</tbody>
</table>

Sources: European Commission, IMF, OECD and Banco de Portugal.

exceeding one year. This increase reflects, inter alia, the high level of uncertainty that characterised the Portuguese economy in the period 2009-12. 2009 and 2010 were marked by the impact of the international financial crisis, particularly on foreign demand developments. The subsequent period was affected by the request for financial assistance, the implementation of measures included in the EFAP and the need to adopt additional fiscal consolidation measures.

The relative performance of Banco de Portugal exceeds that of the remaining institutions for projection horizons of up to one year, with lower figures for the root mean square error of projection and the mean absolute deviation. For horizons of over one year, the relative gains of Banco de Portugal projections are more limited, with the two-year analysis being conditioned by the small number of observations available.

2.2. Breakdown of Banco de Portugal’s projection errors

By breaking down projection errors, it is possible to identify the impact of deviations from assumptions, namely as regards international developments and the adoption of fiscal measures specified only after projections have already been released. Similarly to the previous subsection, Subsection 2.2 looks into projection errors for the period 2009-12.

The breakdown of projection errors entails the development of a counterfactual, i.e., the macroeconomic scenario that would occur if the future external environment and fiscal policy developments was known at the time of projection. For this purpose, the quarterly model used by Banco de Portugal when preparing projections for the Portuguese economy is applied here. The projection error component that does not result from changes in the external environment or fiscal assumptions reflects the impact of behavioural factors that were not anticipated at the time of projection, e.g., unanticipated developments in non-price competitiveness with an impact on the export market share, changes in the behaviour of agents compared with the pre-financial crisis period, the materialisation of uncertainty and risk factors related to the confidence levels of agents or the impact of changes in the institutional framework.

Chart 2 presents the breakdown of Banco de Portugal’s projection errors resulting from this exercise for 2009, 2010, 2011 and 2012 in each Economic Bulletin issue. The analysis of the external environment of the Portuguese economy took into account the projection errors for variables included in the set of common assumptions in Eurosystem exercises, namely external demand for Portuguese goods and services, interbank money market interest rates, exchange rates and oil prices. Turning to fiscal assumptions, the exercise takes into account deviations from assumptions for developments in government consumption and public sector wages, developments in government transfers to households (mostly related to social benefits and the payment of old age and disability pensions) and developments in direct and indirect taxes. Moreover, the impact from changes in the export market share resulting from factors


**Sources:** European Commission, IMF, OECD and Banco de Portugal.

**Notes:** The projection error corresponds to the difference between the value projected and the actual value. A positive value (negative) represents an overvaluation (undervaluation). The horizontal axis indicates the date in which the projection was produced and is identified by the corresponding Banco de Portugal’s Economic Bulletin issue. The contribution of Portuguese exports market share reflects only the component that is not due to changes in external assumptions, in particular the nominal effective exchange rate.

Other than developments in the nominal effective exchange rate was isolated given their impact over the most recent period.

Overall, Banco de Portugal’s projection errors have mainly resulted from the non-materialisation of international environment and fiscal assumptions. Moreover, for the most recent period, the materialisation of factors related to non-price competitiveness has resulted in unanticipated market share gains for Portuguese exports.

This breakdown suggests that international environment assumptions have played a key role in terms of both underestimating the contraction in economic activity in 2009 and its subsequent recovery in 2010, particularly when looking into projection horizons of over six months. The projection error for these years was particularly driven by the inability to anticipate the discrete and, partly, temporary nature of the fall in international trade flows in late 2008 and early 2009 and, consequently, its impact on Portuguese exports. International environment developments have, therefore, played a major role both in terms of the contraction in activity in 2009 and its recovery in 2010. It should be noted that, over these years, the contribution of fiscal factors to projection errors was negligible, which implies that the assumptions used were largely correct.
The relatively small contribution of both the residual component and unanticipated changes in the export market share in 2009 indicates that projections would have been correct if the magnitude of the fall in external demand had been anticipated. As regards 2010, the underestimation of a recovery in the course of that year was due to assumptions on external demand growth, which pointed to a greater persistence of the contraction in international trade flows. The residual component indicates that this underestimation of GDP growth in 2010 has been partially offset by other unanticipated factors. One of these factors was a smaller-than-projected drop in the households’ savings rate, which seems to have led to consumption growth below that implied by disposable income developments. These developments in savings seem to have resulted from an unanticipated tightening in financing conditions and a rise in precautionary savings, against a background of intensified financial crisis and increasing uncertainty.

Turning to 2011, the underestimation of the fall in activity for projection horizons of over six months mainly reflects the non-incorporation of fiscal consolidation measures associated with the request for financial assistance prior to their presentation in greater detail in mid-May 2011. The component linked to the external environment played a limited role in the underestimation of the fall in GDP in 2011. However, the materialisation of unanticipated export market share gains contributed to mitigate the impact of unexpected consolidation measures. The residual component indicates that, in addition to these assumptions, other factors have contributed, albeit to a lesser extent, to the underestimation of the contraction in activity included in the projections published prior to the request for financial assistance. As such, in 2011 the savings rate was clearly higher than anticipated, although private sector wage growth was smaller than projected before April 2011. As in 2010, these developments reflected a marked deterioration in confidence levels and an increase in liquidity restrictions.

As regards 2012, the underestimation of the contraction in activity mainly reflects the non-incorporation of additional fiscal consolidation measures, which were only known in detail after the release of the State Budget for 2012 (i.e., after the cut-off date for data incorporated in the Autumn 2011 issue of the Economic Bulletin), as well as a sharper deterioration in the international environment, particularly as regards the outlook for external demand (whose magnitude only became clear as of the Spring of 2012). However, the impact of an unanticipated deterioration in the outlook for external demand on the contraction in activity seems to have been largely offset by more-favourable-than-expected developments in the market share of Portuguese exports. Moreover, a set of other factors contributed to the underestimation in the projections released before April 2011, most notably, higher-than-expected wage moderation prior to the EFAP.

The breakdown of projection errors suggests that international environment and fiscal assumptions have greatly contributed to those errors over the most recent period. Against a background of high volatility and uncertainty, the difficulty of foreseeing developments in the international environment had a particular impact on the underestimation of the temporary upturn in economic activity in 2010. Over the most recent period, the inability to foresee the nature of the fiscal measures that would be needed to comply with targets for horizons exceeding that of the State Budget in each given year, as well as the sharper deterioration in the international environment, seem to have played a key role in the underestimation of the magnitude of recent recessions.

3. Conclusions

Projections regularly published by Banco de Portugal fall within the remit of the central bank’s mission concerning the maintenance of price stability and financial system stability. GDP growth projection errors published by the organisations that regularly monitor developments in the Portuguese economy are closely correlated, which reflects the use of very similar instruments and assumptions. Nonetheless, projections produced by Banco de Portugal tend to be more precise. Moreover, the sign of projection errors tends to be common to all institutions.
Projections produced by Banco de Portugal are based on a set of assumptions which have been subject to particular uncertainty over the most recent period, and whose non-materialisation has resulted in significant projection errors. The breakdown of projection errors suggests that the non-materialisation of international environment and fiscal assumptions is behind a considerable share of projection errors over the most recent period, thereby increasing the importance of the risk and uncertainty analysis and the identification of risk factors. Over the most recent period, the materialisation of unanticipated export market share gains seems to have mitigated the impact of a worse-than-expected international environment.

Taking into account the compiled data, the release of alternative scenarios and the presentation of a sensitivity analysis on different assumptions underlying projections could contribute to a better uncertainty and risk analysis.